



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,653	03/17/2004	Peter Zentgraf	P25021	1681
7055 7590 07/02/2007 GREENBLUM & BERNSTEIN, P.L.C. 1950 ROLAND CLARKE PLACE RESTON, VA 20191			EXAMINER PIPALA, EDWARD J	
			ART UNIT 3663	PAPER NUMBER
			NOTIFICATION DATE 07/02/2007	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

gbpatent@gbpatent.com  
pto@gbpatent.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/801,653	<b>Applicant(s)</b> ZENTGRAF, PETER	
	<b>Examiner</b> Edward Pipala	<b>Art Unit</b> 3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2007.  
 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.  
 4a) Of the above claim(s) 5,6 and 12-14 is/are withdrawn from consideration.  
 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
 6) ☒ Claim(s) 1-4 and 7-11 is/are rejected.  
 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☒ The drawing(s) filed on 17 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) ☒ All b) ☐ Some \* c) ☐ None of:  
 1. ☒ Certified copies of the priority documents have been received.  
 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                      |                                                                   |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____                                                          | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/19/07 has been entered.

Claims 1-14 are presently pending, claims 5, 6 and 12-14 have been withdrawn from consideration. Accordingly, claims 1-4 and 7-11 are presently being examined.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-4 and 8-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

At issue here is Applicant's use of the term "should", with respect to having the nozzle control vector meet the minimization criterion, leaving open the question of whether or not the following recited minimization criterion even needs to be met as long as the recited steps of generating a matrix transformation, data processing a geometric description of the matrix transformation, searching with a geometric-assisted search

Art Unit: 3663

procedure in vector space, applying a matrix transformation and subsequently controlling nozzles in what "should" be an optimum-fuel control instruction.

The dependent claims 2-4 and 9-11 are included because they depend from an indefinite base claim, and are therefore also considered to be indefinite.

### ***Claim Rejections - 35 USC § 101***

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-4 and 7-11 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter in that the claimed "method of computer assisted determination of optimum-fuel control of nozzles according to a control instruction  $b=Ax$ " is still reciting only a series of mathematical matrix operations in which a multidimensional array representing a force(s)/torque vector and a nozzle matrix is operated upon using a well known minimization procedure and a geometric representation of limit points in vector space so as to control the nozzles in or with what should be an optimum fuel control strategy.

The preamble of each of independent claims 1 and 7 Applicant recites a method for the "computer assisted determination" (claim 1) and "[a] computer control method" (claim 7), to obtain an optimum fuel control of nozzles and then goes on to lay out the matrix representations for the terms of the control instruction, and a series of data manipulation steps of computer generation of starting constraints, data processing a representation of a

Art Unit: 3663

geometric description of the starting constraints, searching limiting points sets of the geometric description with a computer-assisted geometric search procedure, and then applying the matrix transformation of the minimization criterion to the points of the limiting point set (claim 1 being used as a representative example).

Dependent claims 2-4 further involve additional matrix/mathematical manipulations and calculation, where claim 2 recites finding a homogenous solution to the control instruction for the starting constraints, claim 3 recites more matrix transformation and determining of limiting point sets, where claim 4 adds repeatedly projecting allowable multi-dimensional value regions of the dimension  $p$  and subsequently searching with a computer-assisted search procedure for a determination of limiting point sets as a cut set of limiting intervals.

The scope of independent claim 7 further appears to be broader than that of independent claim 1, since some of that subject matter (as found in claim 1), is now in the form of dependent claim 8 (defining the control instruction  $b=Ax$ , along with the nozzle matrix and nozzle control vector). Dependent claim 9 (depending from claim 8) further recites determining a homogenous solution for the control instruction and introduces a new claim limitation in the form of scalar products of a vector representation of points of the limiting point set and calculating an optimum-fuel solution with the aid of vector  $r$  whose scalar product is minimal with vector  $v_d$ . Claim 10 is similar to previous claim 3, and claim 11 is similar to previous claim 4.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4 and 7-11 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Schütte et al. (6,208,915).

Schütte et al. disclose a method for the on the whole minimum-fuel, computer-assisted control of an optionally determined number of thrusters, arranged as desired on a spacecraft, is to be specified, which method solves this linear optimization problem within the shortest possible time by reducing the computation expenditure. The method depends on the dual simplex algorithm and a suitably provided dual permissible start table. The dual permissible start table is set up on the basis of a previously computed optimum table and the transformation of the actual forces-moments vector belonging to the selected start table. Specific processing steps in the dual simplex algorithm are either not needed at all or are substituted with processing steps that require considerably less computation expenditure. Finally, a reduced table is used in place of the simplex table. This reduced table consists only of an identification number for a thruster, selected from the total number of thrusters, and the vector for the control values of the thrusters contained in this thruster selection. The reduction in computation expenditure is achieved in that specific processing steps are performed ahead of time and the corresponding results are then available in the form of data fields and indices or identification number matrixes in the

working memory of the computer. In order to compute the thruster actuation, it is then only necessary to address and request these results of the initialization part of the method.

### ***Conclusion***

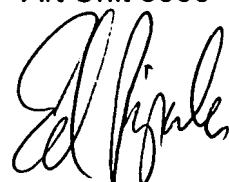
5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edward Pipala whose telephone number is 571-272-1360. The examiner can normally be reached on M-F 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Edward Pipala

Art Unit 3663



ejp